

IN THE CLAIMS

The following claim listing replaces all prior listings and versions thereof:

1. (Currently Amended) A cam mechanism comprising:

a cam ring; and

a linearly movable frame movable by said cam ring along an optical axis of an optical system without rotating, by engagement of a first and a second plurality of cam grooves located on said cam ring with a corresponding first and second plurality of complementing cam followers located on said linearly movable frame, when said cam ring is rotated, said linearly movable frame supporting at least one optical element of said optical system,

wherein said first plurality of cam grooves are located at different positions than positions of said second plurality of cam grooves, in both said optical axis direction and a circumferential direction of said cam ring, and respectively trace substantially a same reference cam diagram; and

wherein said first plurality of complementing cam followers are located at different positions than positions of said second plurality of cam followers, in both said optical axis direction and a circumferential direction of said linearly movable frame, and are engageable in said plurality of cam grooves, respectively.

2. (Currently Amended) The cam mechanism according to claim 1, wherein said first and second plurality of cam grooves comprises respectively comprise a front plurality of cam groove grooves and a rear plurality of cam groove grooves positioned behind said front plurality of cam groove grooves in said optical axis direction, and wherein said first and second plurality of complementing cam followers comprises respectively comprise a front plurality of cam follower followers and a rear plurality of cam follower followers positioned

behind said front plurality of cam follower followers in said optical axis direction and are engageable in said plurality of front cam groove grooves and said plurality of rear cam groove grooves, respectively.

3. (Currently Amended) The cam mechanism according to claim 1, wherein at least one cam groove of one of said first and second plurality of cam grooves intersect another intersects at least one cam groove thereof of the other of said first and second plurality of cam grooves; and

wherein at least one cam follower of one of said first and second plurality of complementing cam followers remains engaged in a corresponding one of said first and second plurality of cam grooves when another cam follower of the other of said first and second plurality of complementing cam followers passes through an intersection of said cam grooves at least one cam groove of one of said first and second plurality of cam grooves with said at least cam groove of the other of said first and second plurality of cam grooves, during a rotation of said cam ring.

4. (Original) The cam mechanism according to claim 3,
wherein said reference cam diagram includes a zooming range and is configured to perform a zooming operation; and

wherein said intersection is outside said zooming range.

5. (Currently Amended) The cam mechanism according to claim 1, wherein said cam ring comprises a plurality of cam groove groups, each cam groove group including at least two cam grooves of said plurality of cam grooves located at different positions both in said optical axis direction and said circumferential direction of said cam ring, and respectively trace substantially a same reference cam diagram a cam groove of said first

plurality of cam grooves and a cam groove of said second plurality of cam grooves; and

wherein said linearly movable frame comprises a plurality of cam follower groups, each cam follower group including ~~at least two complementing cam followers of said plurality of complementing cam followers located at different positions both in said optical axis direction and said circumferential direction of said linearly movable frame~~ a cam follower of said first plurality of cam followers and a cam follower of said second plurality of cam followers.

6. (Currently Amended) The cam mechanism according to claim 5, wherein at least one of said ~~at least two cam grooves~~ cam groove of one said cam groove group ~~groups~~ intersects with another ~~of said at least two cam grooves~~ said cam groove of another said cam groove group, said another said cam groove adjacent to said at least one said cam groove in said circumferential direction.

7. (Currently Amended) The cam mechanism according to claim 1, wherein each cam groove of said first and second plurality of cam grooves has at least one end opening at at least one of opposite ends of said cam ring, so as not to include an entire portion of said reference cam diagrams; and

wherein at least one cam follower of one of said first and second plurality of complementing cam followers remains engaged in a corresponding cam groove of one of said first and second plurality of cam grooves while another cam follower of the other of said first and second plurality of complementing cam followers comes out of said end opening of a corresponding another cam groove of the other of said first and second plurality of cam grooves, during a rotation of said cam ring.

8. (Original) The cam mechanism according to claim 1, wherein said optical system

comprises a plurality of movable lens groups movable in said optical axis direction while changing a distance therebetween by a rotation of said cam ring, said linearly movable frame holding at least one of said plurality of movable lens groups.

9. (Original) The cam mechanism according to claim 1, wherein said optical system comprises a photographing lens system.

10. (New) The cam mechanism according to claim 7, wherein a width of said at least one end opening of said each cam groove of one of said first and second plurality of cam grooves is greater than a width of remaining portions of said each cam groove.

11. (New) A digital camera comprising a body and a lens barrel housed within the body, said lens barrel having a cam mechanism, the cam mechanism comprising:

a cam ring; and

a linearly movable frame movable by said cam ring along an optical axis of an imaging optical system, by engagement of a first and a second plurality of cam grooves located on said cam ring with a corresponding first and second plurality of cam followers located on said linearly movable frame, when said cam ring is rotated, said linearly movable frame supporting at least one optical element of said optical system,

wherein said first plurality of cam grooves are located at different positions than positions of said second plurality of cam grooves, in both said optical axis direction and a circumferential direction of said cam ring, and respectively trace substantially a same reference cam diagram; and

wherein said first plurality of cam followers are located at different positions than positions of said second plurality of cam followers, in both said optical axis direction and a circumferential direction of said linearly movable frame, and are engageable in said plurality

of cam grooves, respectively.

12. (New) The camera according to claim 11, wherein said first and second plurality of cam grooves respectively comprise a front plurality of cam grooves and a rear plurality of cam grooves positioned behind said front plurality of cam grooves in said optical axis direction, and wherein said first and second plurality of cam followers respectively comprise a front plurality of cam followers and a rear plurality of cam followers positioned behind said front plurality of cam followers in said optical axis direction and are engageable in said front plurality of cam grooves and said rear plurality of cam grooves, respectively.

13. (New) The camera according to claim 11, wherein at least one cam groove of one of said first and second plurality of cam grooves intersects at least one cam groove of the other of said first and second plurality of cam grooves; and

wherein at least one cam follower of one of said first and second plurality of cam followers remains engaged in a corresponding one of said first and second plurality of cam grooves when another cam follower of the other of said first and second plurality of cam followers passes through an intersection of said at least one cam groove of one of said first and second plurality of cam grooves with said at least one cam groove of the other of said first and second plurality of cam grooves, during a rotation of said cam ring.

14. (New) The camera according to claim 13,
wherein said reference cam diagram includes a zooming range and is configured to perform a zooming operation; and

wherein said intersection is outside said zooming range.
15. (New) The camera according to claim 11, wherein said cam ring comprises a plurality of cam groove groups, each cam groove group including a cam groove of said first

plurality of cam grooves and a cam groove of said second plurality of cam grooves; and

wherein said linearly movable frame comprises a plurality of cam follower groups, each cam follower group including a cam follower of said first plurality of cam followers and a cam follower of said second plurality of cam followers.

16. (New) The camera according to claim 15, wherein at least one said cam groove of one said cam groove groups intersects with another said cam groove of another said cam groove group, said another said cam groove adjacent to said at least one said cam groove in said circumferential direction.

17. (New) The camera according to claim 11, wherein each cam groove of said first and second plurality of cam grooves has at least one end opening at at least one of opposite ends of said cam ring, so as not to include an entire portion of said reference cam diagrams; and

wherein at least one cam follower of one of said first and second plurality of cam followers remains engaged in a corresponding cam groove of one of said first and second plurality of cam grooves while another cam follower of the other of said first and second plurality of cam followers comes out of said end opening of a corresponding cam groove of the other of said first and second plurality of cam grooves, during a rotation of said cam ring.

18. (New) The camera according to claim 11, wherein said optical system comprises a plurality of movable lens groups movable in said optical axis direction while changing a distance therebetween by a rotation of said cam ring, said linearly movable frame holding at least one of said plurality of movable lens groups.

19. (New) The camera according to claim 17, wherein a width of said at least one

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end opening of said each cam groove of one of said first and second plurality of cam grooves
is greater than a width of remaining portions of said each cam groove.